Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

caption. The omission of any discussion of even the simplest types of simultaneous quadratics is unfortunate in a text explicitly designed for "the student who will continue his mathematics as far as the calculus." In analytic geometry simultaneous quadratics occur as frequently as any topic of algebra. The extension of Horner's method to the computation of larger roots by approximating first to hundreds, then tens, then units, is desirable. No hint of this is given in the text nor is any problem presented which suggests this extension.

Only one historical note is found in the text and that involves a disputed point. Tartaglia arrived at the solution of the cubic before Cardan, as the latter stated in his published work. However Scipio Ferro (died 1526), also cited by Cardan, was prior to both in the solution of the cubic of the form, $x^3 + ax = b$.

L. C. KARPINSKI.

PROBLEMS AND QUESTIONS.

B. F. FINKEL, CHAIRMAN OF THE COMMITTEE.

PROBLEMS FOR SOLUTION.

ALGEBRA.

388. Proposed by JOSEPH V. COLLINS, Stevens Point, Wis.

On a certain typewriter there is a double scale as follows:

80........70........60........50........40........30........20........10........ 0
1 .... 5........10........15........20........25........30........35........40

It is used to locate headings in the middle of the page. To space a heading one sets the machine at the right stop and with the spacer counts out the number of letters and spaces in the heading. To the reading on the 40 scale where the carriage stops is added the reading of the right stop on the same scale. This number is the one on which to set the carriage pointer on the 80 scale to begin the heading. Show by algebra that the method is correct.

389. Proposed by W. W. BEMAN, Univ. of Michigan.

If $e^{e^x} = 1 + a_1x + a_2x^2 + a_3x^3 \cdots$, prove that

$$na_n = \Sigma_{k=1}^{k=n} \frac{1}{(k-1)!} a_{n-k}, \qquad \text{or} \qquad n!\,a_n = \Sigma_{k=1}^{k=n} \frac{(n-1)!}{(k-1)!} a_{n-k},$$

which latter form lends itself more readily to computation.

390. Proposed by E. B. ESCOTT, University of Michigan.

Sum the series,

$$\tfrac{1}{1} + \tfrac{1}{2} + \tfrac{2}{4} + \tfrac{3}{8} + \tfrac{5}{16} + \tfrac{8}{32} + \cdots,$$

where each numerator is the sum of the two preceding and the denominators are in geometrical progression.

391. Proposed by C. N. SCHMALL, New York, N. Y.

Show that the roots of the quadratic

$$ax^2 + 2bx + c = 0$$

are imaginary if a, b, c, are in harmonic progression and have the same sign.

GEOMETRY.

417. Proposed by R. P. BAKER, University of Iowa.

Enumerate the points in which the twelve dihedral bisector planes of a tetrahedron meet, find their multiplicity and account for the 220 points which 12 planes in general determine.

418. Proposed by MRS. H. E. TREFETHEN, Waterville, Maine.

The difference of the squares of the two interior diagonals of a cyclic quadrilateral is to twice their rectangle as the distance between their mid-points is to the third diagonal.

419. Proposed by S. LEFSCHETZ, University of Nebraska.

Given a circle and a tangent to it. To find a point on its circumference such that the sum of its distances to the tangent and its point of contact shall be equal to a given length.

(Rouché et de Comberousse: *Géométrie.*)

CALCULUS.

339. Proposed by T. H. GRONWALL, Chicago, Ill.

To show that for any real value of x

$$\left|\frac{d^n}{dx^n}\left(\frac{\sin x}{x}\right)\right| \leqq \frac{1}{n+1}, \quad \text{and} \quad \left|\frac{d^n}{dx^n}\left(\frac{1-\cos x}{x}\right)\right| \leqq \frac{1}{n+1}.$$

340. Proposed by C. N. SCHMALL, New York, N. Y.

A pencil of parallel rays of light is incident upon a lens whose faces have the radii r_1, r_2, respectively. Show that the distance of the principal focus from the center of the first face of the lens will be a maximum or a minimum when

$$\frac{r_1}{r_2} = \frac{(\mu - 1)^{1/2}}{1 + (\mu - 1)^{1/2}},$$

where μ has its usual meaning.

341. Proposed by E. B. ESCOTT, University of Michigan.

Find an expression for the volume of a barrel in terms of the length l, the bung diameter a, and the head diameter b, also an approximate expression when a and b are nearly equal.

MECHANICS.

271. Proposed by V. M. SPUNAR, Chicago, Ill.

Find the center of gravity of the volume formed by the revolution around the x-axis of the area of the curve $y^4 - axy^2 + x^4 = 0$.

272. Proposed by W. J. GREENSTREET, Editor Mathematical Gazette, England.

Around a smooth fixed circular pulley is wound a massless inextensible string, and straight portions go to two free ends A and B to which masses are fastened. The mass at A is initially projected perpendicular to the string while the other is initially at rest. The length of the straight portion to the first mass is initially l and subsequently is r. Find the velocity of the second mass at that moment.

NUMBER THEORY AND DIOPHANTINE ANALYSIS.

187. Proposed by L. E. DICKSON, University of Chicago.

Find an amicable number triple by solving one of the equations (other than the last) in the MONTHLY, March, 1913, page 92. Note that a solution a is to be excluded if not prime to the numbers in the same line.

188. Proposed by ARTEMAS MARTIN, Washington, D. C.

Find rational values for v, w and x that will satisfy simultaneously the conditions

$$(m^2 + n^2)(v^2 + w^2 + x^2)^2 - 4m^2n^2v^2 + m^2n^2(m^2 + n^2) = 0, \tag{1}$$

$$(m^2 + n^2)(v^2 + w^2 + x^2)^2 - 4m^2n^2w^2 + m^2n^2(m^2 + n^2) = 0, \tag{2}$$

$$(m^2 + n^2)(v^2 + w^2 + x^2) - 4m^2n^2x^2 + m^2n^2(m^2 + n^2) = 0, \tag{3}$$

m and n being known quantities.

189. Proposed by W. E. HEAL, Washington, D. C.

Develop a formula for the value of x in the equation $p^x + q^x = s^x$, p, q, and s being integral numbers.